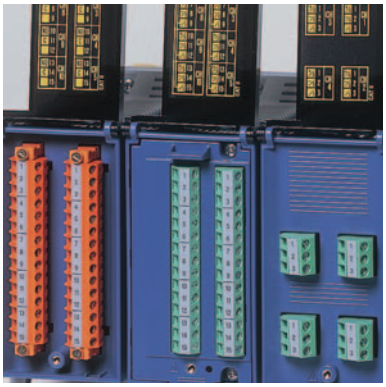
YOKOGAWA

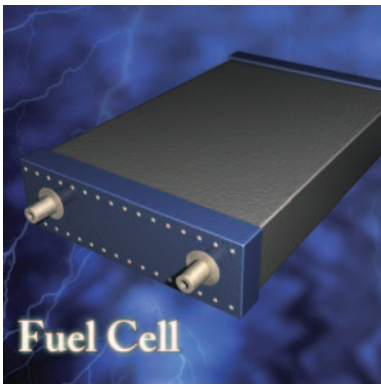
DAQMASTER™

PC-Based Data Acquisition Unit

MX100

A PC-based data acquisition system for the future, delivering unparalleled performance. When combined with Yokogawa's proprietary PC software, the MX100's high speed, multi channel capability, and high withstand voltage offers the ultimate in measurement power.





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the ultimate in measurement power.**

Maximum Performance.....

■ High-Speed, Multi-Channel Capability, High withstand Voltage

- Shortest measurement interval of 10 ms (high-speed measurement of 10 ms on 24 channels or 100 ms on 60 channels is possible).
- Possible to acquire data from up to 1,200 channels (when using Yokogawa's proprietary software).
- Reinforced insulation between the input terminal and the case handles 3700 Vrms for one minute, or 600 Vrms/VDC continuous.

■ Multi-Interval Measurement

- Mixed use of three types of measurement intervals is enabled within the system (measurement intervals are set for each module).

Ease of Use.....

■ Flexible System Configuration

By configuring modules, a system can be built or modified to utilize 4 to 1,200 channels, and measurement intervals of 10 ms to 60 s.

■ Versatile PC-Based Software Options

Software developed by Yokogawa, an API, and a LabVIEW driver are available.

■ Easy Software Setup

PC software developed by Yokogawa automatically identifies any connected MX100s.

■ No Re-Wiring between Measurements

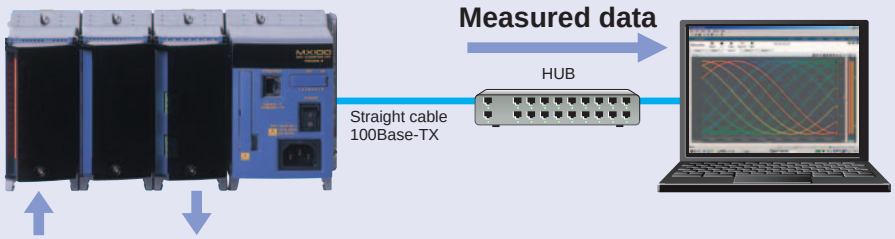
A removable terminal unit is available.

System Configuration

**MX100 is a data acquisition unit designed to operate as a front end for PCs.
Data measured by MX100 is transferred to PCs in real-time.**

Connection between a single MX unit and a single PC (measurement of 24 channels/10 ms or 60 channels/100 ms)

One MX unit enables data acquisition on up to 24 channels at a measurement interval of 10 ms or up to 60 channels at a measurement interval of 100 ms (six modules installed in both cases).



Input signal:
DC voltage
Thermocouple
RTD
Digital input
(Mixed input possible)

Output signal:
Digital output

<Setting up the System>

The MX and PC are connected via a hub and a straight Ethernet cable. Alternatively, they can be connected using a cross cable alone, without using the hub.

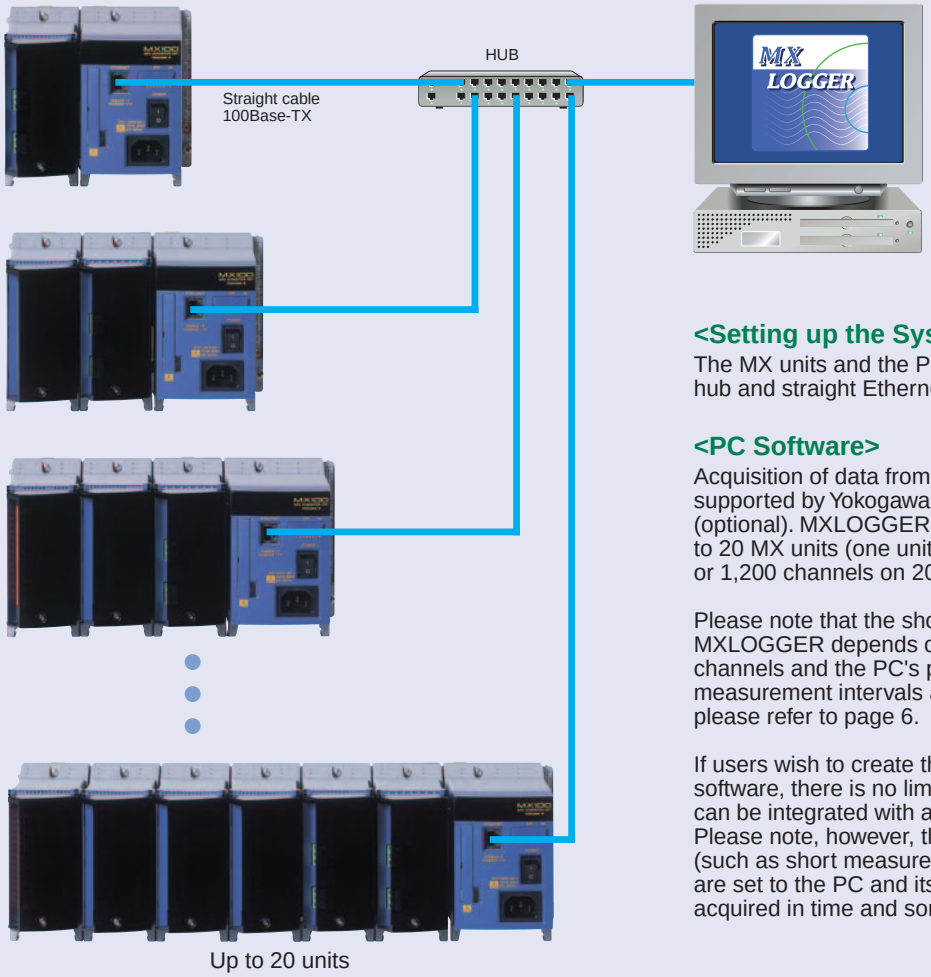
<PC Software>

In a one-to-one connection, the MX100 standard software included with the main module facilitates easy building of data acquisition environments.

One MX unit consists of a combination of a main module, input/output modules, and a base plate. This configuration centers on the main module. For details, refer to pages 4 and 5.

Connection between multiple MX units and a single PC (for measurement of up to 1,200 channels and the use of MXLOGGER)

Example of a system with multiple MX units:



<Setting up the System>

The MX units and the PC are connected by means of a hub and straight Ethernet cables.

<PC Software>

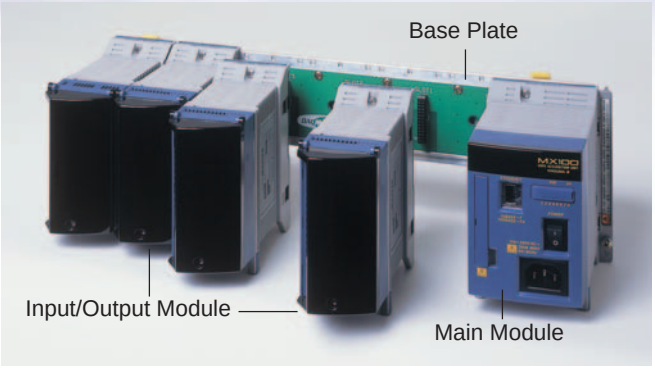
Acquisition of data from multiple MX units is well-supported by Yokogawa's software "MXLOGGER" (optional). MXLOGGER enables data acquisitions of up to 20 MX units (one unit has inputs of up to 60 channels, or 1,200 channels on 20 units).

Please note that the shortest measurement interval of MXLOGGER depends on the system's total number of channels and the PC's performance. For guidelines on measurement intervals and the number of channels, please refer to page 6.

If users wish to create their own data acquisition software, there is no limit to the number of MX units that can be integrated with a single PC software element. Please note, however, that if conditions with heavy loads (such as short measurement intervals with many units) are set to the PC and its software, data will not be acquired in time and some data may be lost.

Maximum Performance, and Ease of Use.....

The MX is designed to enable desired measurement environments by combining three elements: the main module, input/output modules, and a base plate.
The assembled unit can be utilized on the desktop as-is (the modules have legs). Please note that DIN rails are used for rack-mounting.



Main Module (MX100)

The main module is the engine that controls data acquisition. It is equipped with a power supply, an Ethernet port, and a CompactFlash card slot. One main module can accommodate up to six input/output modules. The user can choose up to six moduels of any type.

Ethernet Port:

For communication with the PC. Automatic recognition of 100Base-TX or 10Base-T

CF (CompactFlash) Card Slot:

With the CF Card, measured data is saved to the card if communication with the PC is interrupted. Since the card provides data backup, you do not have to worry about the possible loss of data even if the MX is configured for PC-based measurement.

Data Backup Time by CF Card Size
(Note: Minutes/hours/days are approximate.)

Number of saved channels	Measurement interval	32 M	128 M	512 M
10 channels	10 ms	2 hours	9 hours	36 hours
	100 ms	21 hours	3.5 days	15 days
	500 ms	4.5 days	18.5 days	75.5 days
	2 s	18 days	75.5 days	303 days
24 channels	10 ms	54 minutes	3.5 hours	15 hours
	100 ms	9 hours	37 hours	6 days
	500 ms	45 hours	7.5 days	31.5 days
	2 s	7.5 days	31.5 days	126 days
60 channels	10 ms	18 minutes	75 minutes	5 hours
	100 ms	3.5 hours	15 hours	2.5 days
	500 ms	18 hours	3 days	12.5 days
	2 s	3 days	12.5 days	50 days

Input/Output Modules (MX110, MX115, MX125)

Four-Channel High-Speed Universal Input Module
MX110-UNV-H04

Note: All I/O modules are fitted with a swing-up terminal cover.

Shortest measurement interval: 10 ms;
Maximum number of input channels: 4 channels;
Mixed input of DC voltage, thermocouple, RTD, and digital input: possible.
Please note that the shortest measurement interval for temperature is 50 ms for this module.

Ten-Channel Medium-Speed Universal Input Module
MX110-UNV-M10

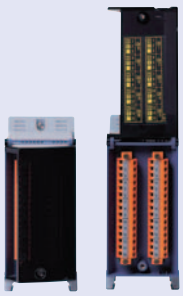
Shortest measurement interval: 100 ms;
Maximum number of input channels: 10 channels;
Mixed input of DC voltage, thermocouple, RTD, and digital input: possible

Ten-Channel High-Speed Digital Input Module
MX115-D05-H10

If a single unit consists of this module only, measurement of 60 channels/10 ms is possible.
Most suitable for measurement of digital input signals at many points inexpensively.

Shortest measurement interval: 10 ms;
Maximum number of input channels: 10 channels;
Digital input dedicated module.

Ten-Channel Medium-Speed Digital Output Module
MX125-MKC-M10

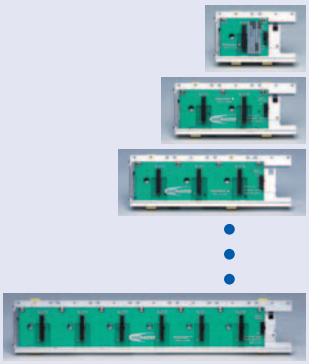


For use of alarm outputs, etc.

Shortest output interval: 100 ms;
Maximum number of output channels: 10 channels;
Digital output dedicated module.

Base Plate (MX150)

The main module and input/output modules are connected by means of connectors on a base plate.



For one input/output module

through

six input/output modules

<Using the Base Plate for Six Input/Output Modules>

Although the position for the main module is fixed, input/output modules can be configured in any position using the module connectors. One to six modules can be used.

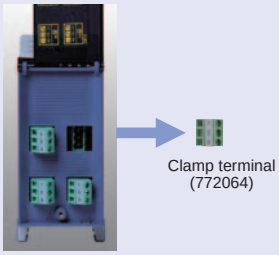
Connector covers (772066) are available for vacant slots.

Modules and Terminals

<Attachable/Detachable Terminals>

All input terminals can be attached/detached. If the user provides multiple terminals, there is no need to perform rewiring every time measurement is carried out.

Four-Channel High-Speed Universal Input Module
MX110-UNV-H04



Clamp terminal (772064)

Each terminal can be attached/detached.

Ten-Channel Medium-Speed Universal Input Module
MX110-UNV-M10

Ten-Channel High-Speed Digital Input Module
MX115-D05-H10

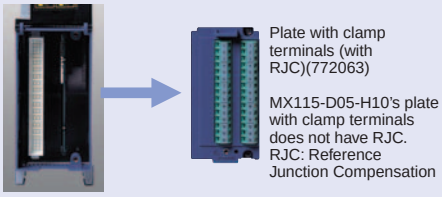
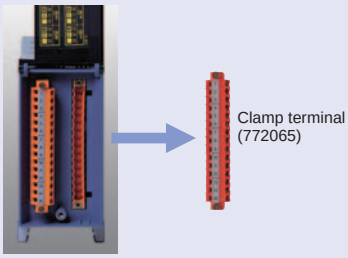


Plate with clamp terminals (with RJC)(772063)

MX115-D05-H10's plate with clamp terminals does not have RJC.
RJC: Reference Junction Compensation

Each plate with terminals can be attached/detached.

Ten-Channel Medium-Speed Digital Output Module
MX125-MKC-M10



Clamp terminal (772065)

Each terminal can be attached/detached.

<Screw Terminal Block>

A separate screw terminal block is available for the MX110-UNV-M10 Ten-Channel Medium-Speed Universal Input Module and the MX115-D05-H10 Ten-Channel High-Speed Digital Input Module.

Connection Cable (772062) between input modules and the screw terminal block

Screw Terminal Block (772061)

The screw terminal block is installed.

Detach the plate with clamp terminals from the MX110-UNV-M10 or MX115-D05-H10. Then, use the connection cable (772062) to connect the input module without the plate to the screw terminal block (772061).

The option code /NC can be added to the MX110-UNV-M10 and MX115-D05-H10 to indicate whether or not the plate with clamp terminals is included at the time of delivery. If the user requires only the screw terminal block and not the clamp terminals, please specify either MX110-UNV-M10/NC or MX115-D05-H10/NC.

<Mounting of Racks or Panels Using the DIN Rail>

Bracket for mounting the DIN rail

Use the DIN rail for mounting on racks or panels. The DIN rail can be easily attached using the dedicated bracket. Two brackets come standard with the base plate (MX150).

Maximum Performance, and Ease of Use.....

High-Speed, Multi-Channel Capability

The table below provides reference information on the maximum number of measurable channels in relevant measurement intervals (when using Yokogawa's proprietary software):

Measurement interval	Maximum number of measurable channels	Measurable objects	PC Software		Number of Necessary Modules (example)		
			MX100 Standard Software	MXLOGGER	Main Module (MX100)	Four-Channel High-Speed Universal Input Module (MX110-UNV-H04)	Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10)
10 ms	24 channels	DCV/DI	√	√	1	6	–
50 ms	24 channels	DCV/TC/RTD/DI	√	√	1	6	–
50 ms	120 channels	DCV/TC/RTD/DI	–	√	5	30	–
100 ms	60 channels	DCV/TC/RTD/DI	√	√	1	0	6
100 ms	300 channels	DCV/TC/RTD/DI	–	√	5	0	30
200 ms	500 channels	DCV/TC/RTD/DI	–	√	9	0	50
500 ms	600 channels	DCV/TC/RTD/DI	–	√	10	0	60
1000 ms	1200 channels	DCV/TC/RTD/DI	–	√	20	0	120

√ measurement that support is possible
– measurement that support is not possible.

The relationship between measurement intervals and the number of channels largely depends on the performance of the PC. The actual performance may differ from that shown in the table.

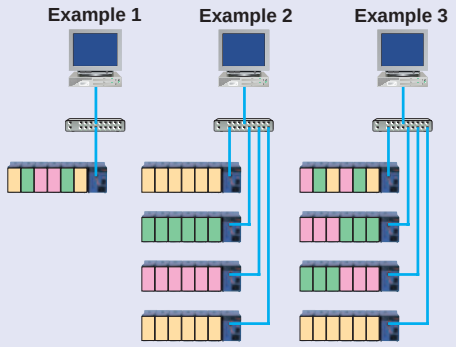
<PC System Requirements> CPU: Pentium 4 3.2 GHz; Memory: 1 GB; OS: Windows 2000; Hard disk: 160 GB; Communication interface: Ethernet 100Base-TX

Multi-Interval Measurement

Three types of measurement intervals can be used in a single system in various combinations. Measurement intervals are specified for each module. It is also possible to set different types of input modules to the same measurement interval or to set the same type of input modules to different measurement intervals. Twelve measurement intervals are available as user-selectable options: 10 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s and 60 s. Please note, however, that measurement intervals of 10/50 ms cannot be set to the Medium-speed Universal Input Module (MX110-UNV-M10).

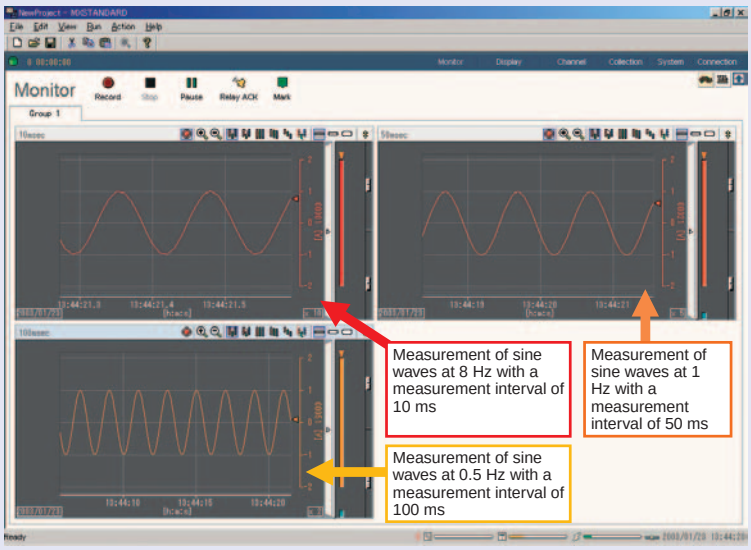
<Examples of Setting Measurement Intervals>

Multi-interval systems can be flexibly built for each module as shown in the figure below. Three colors are used to indicate the three types of measurement intervals.



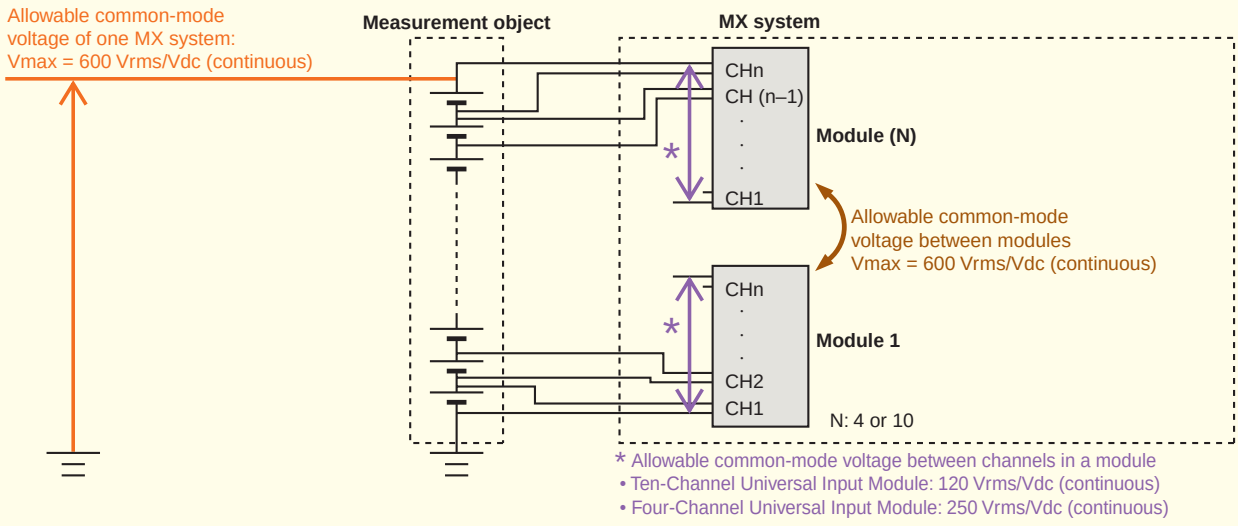
<Monitor Window Using Yokogawa's Proprietary PC Software>

The window shows measurement values by measurement intervals. Measurement can be performed while confirming rapidly-changing signals and slowly-changing signals simultaneously.


Monitor
Measurement of sine waves at 8 Hz with a measurement interval of 10 ms
Measurement of sine waves at 1 Hz with a measurement interval of 50 ms
Measurement of sine waves at 0.5 Hz with a measurement interval of 100 ms

High Withstand Voltage (Reinforced Insulation)

Reinforced (double) insulation has been provided between the input terminals and the case to achieve a high withstand voltage of 600 Vrms/VDC (continuous). As shown below, each battery voltage can be measured even if the batteries are stacked to increase common-mode voltages.


Allowable common-mode voltage of one MX system: Vmax = 600 Vrms/Vdc (continuous)
Measurement object
MX system
CHn
CH (n–1)
CH1
Module (N)
Allowable common-mode voltage between modules Vmax = 600 Vrms/Vdc (continuous)
CHn
CH2
CH1
Module 1
N: 4 or 10
* Allowable common-mode voltage between channels in a module
• Ten-Channel Universal Input Module: 120 Vrms/Vdc (continuous)
• Four-Channel Universal Input Module: 250 Vrms/Vdc (continuous)

Noise Rejection (MX110-UNV-H04)

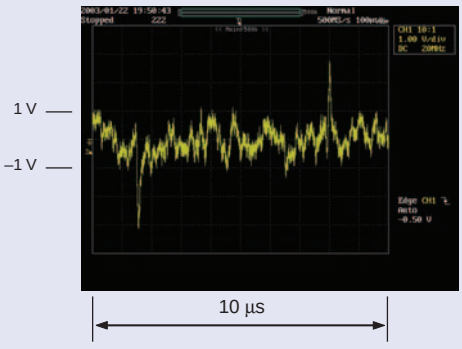
MX input modules employ integrating A/D converters with superior noise rejection performance. In particular, the MX110-UNV-H04 Four-Channel High-Speed Universal Input Module incorporates an integrating A/D converter for each input channel, thereby exhibiting strong noise rejection performance in high-speed measurement. Moreover, the digital filtering function is effective on noises that cannot be fully rejected even with integrating A/D converters. Time constants can be selected from 5 to 100 measurement interval times. Therefore, filtering can be applied according to the noise to be rejected.

<Example of Noise Rejection>

When the noise source in the left figure was applied to the MX, the result in the right figure was obtained. High-speed measurement can be stably performed even in noise environments.

• Noise source applied to MX

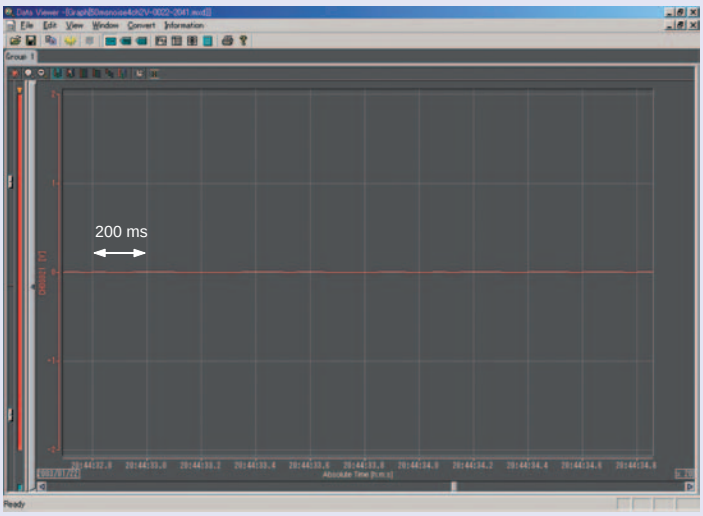
The noise signal was applied between H and L (in normal mode).



Sampling rate: 500 MS/s
Measurement using Yokogawa's Digital Oscilloscope DL1740.

• Output window of MX100 for noise inputs

Module used: MX110-UNV-H04 Four-Channel High-Speed Universal Input Module
Measurement with the range of 2 V (-2 V to +2 V), measurement interval of 50 ms, integral time "Auto" and filter "OFF."



The MX Standard Software was used for PC software.

Maximum Performance, and Ease of Use.....

MX100 Standard Software (Standard Software for the Main Module MX100)

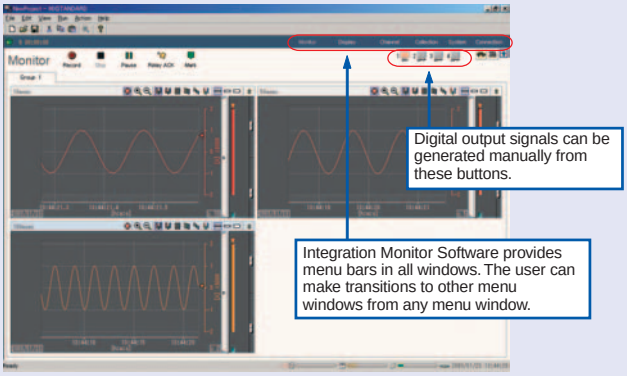
This software is used to connect a single MX unit for performing data acquisition (it is not possible to connect multiple MX units). It includes three software elements: integration monitor, viewer, and calibration.

<Integration Monitor Software>

This software performs real-time monitoring and logging of measured data. It consists of six menus: Monitor Window, Detailed Display Setting, Channel Setting, Acquisition Condition, System Setting, and Connection/disconnection.

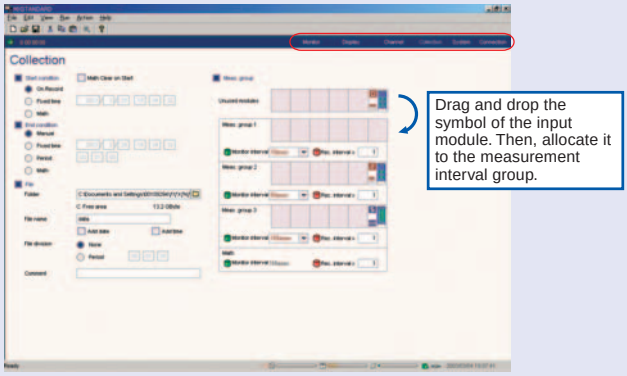
• Monitor Window

This window is used to monitor measured data in real-time. It enables waveform displays and digital displays.


Monitor
Digital output signals can be generated manually from these buttons.
Integration Monitor Software provides menu bars in all windows. The user can make transitions to other menu windows from any menu window.

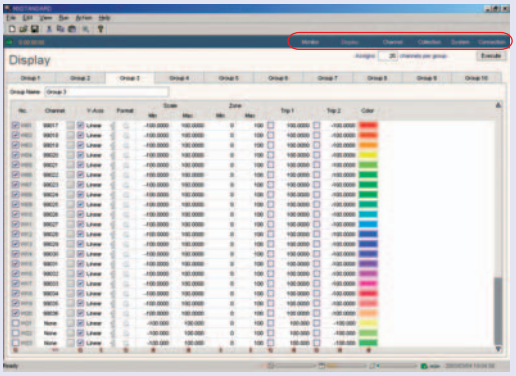
• Acquisition Condition

This menu is used to set various conditions (such as measurement intervals/data save intervals, measurement start/end conditions, or file name designation) for data acquisitions.



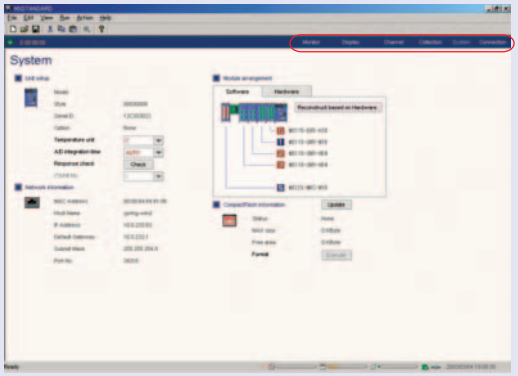
• Detailed Display Setting

This menu is used to set data display states (such as waveform colors) in the monitor window.



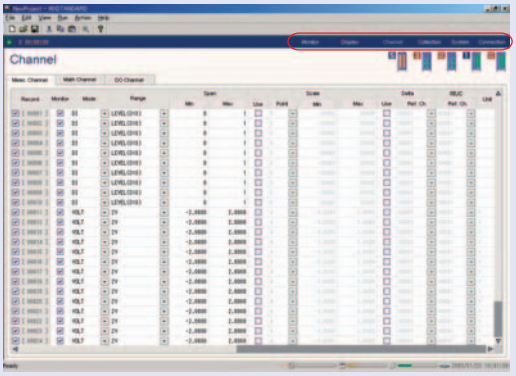
• System Setting

This menu is used to decide module configurations, etc. Module configurations are shown in easily understood diagrams.



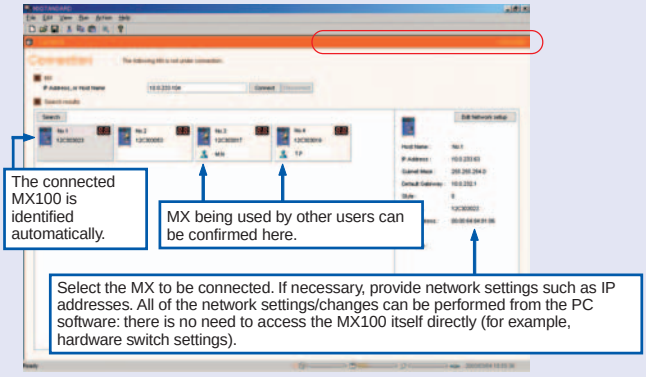
• Channel Setting

This menu is used to enter individual settings (such as range settings) for each input channel or to set computation channels (such as the input of computing equations).



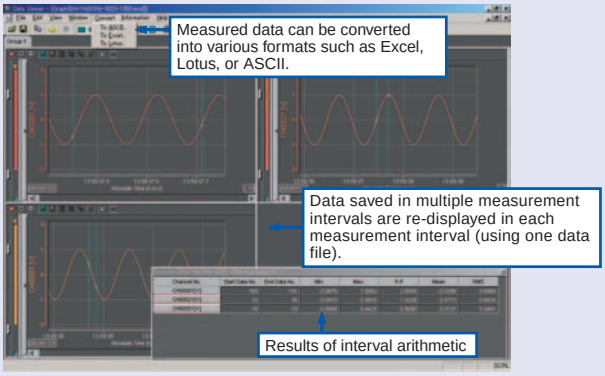
• Connection/Disconnection (Easy to Set Up)

The connected MX100 is identified automatically. Once connection setting information is provided, it will be retained. When the system restarts, the MX100 will be connected automatically without making network settings.


The connected MX100 is identified automatically.
MX being used by other users can be confirmed here.
Select the MX to be connected. If necessary, provide network settings such as IP addresses. All of the network settings/changes can be performed from the PC software: there is no need to access the MX100 itself directly (for example, hardware switch settings).

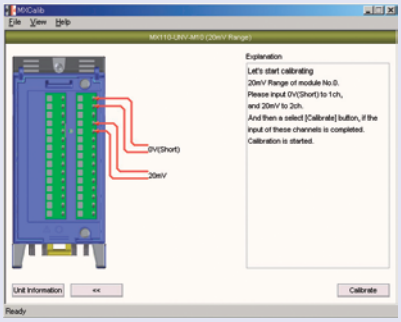
<Viewer Software>

This software is intended to re-display saved data. It enables waveform displays, digital displays, cursor displays, interval arithmetic, and other functions.


Measured data can be converted into various formats such as Excel, Lotus, or ASCII.
Data saved in multiple measurement intervals are re-displayed in each measurement interval (using one data file).
Results of interval arithmetic

<Calibration Software>

This software is intended to efficiently carry out the calibration of universal input modules.



MXLOGGER (Optional PC Software)

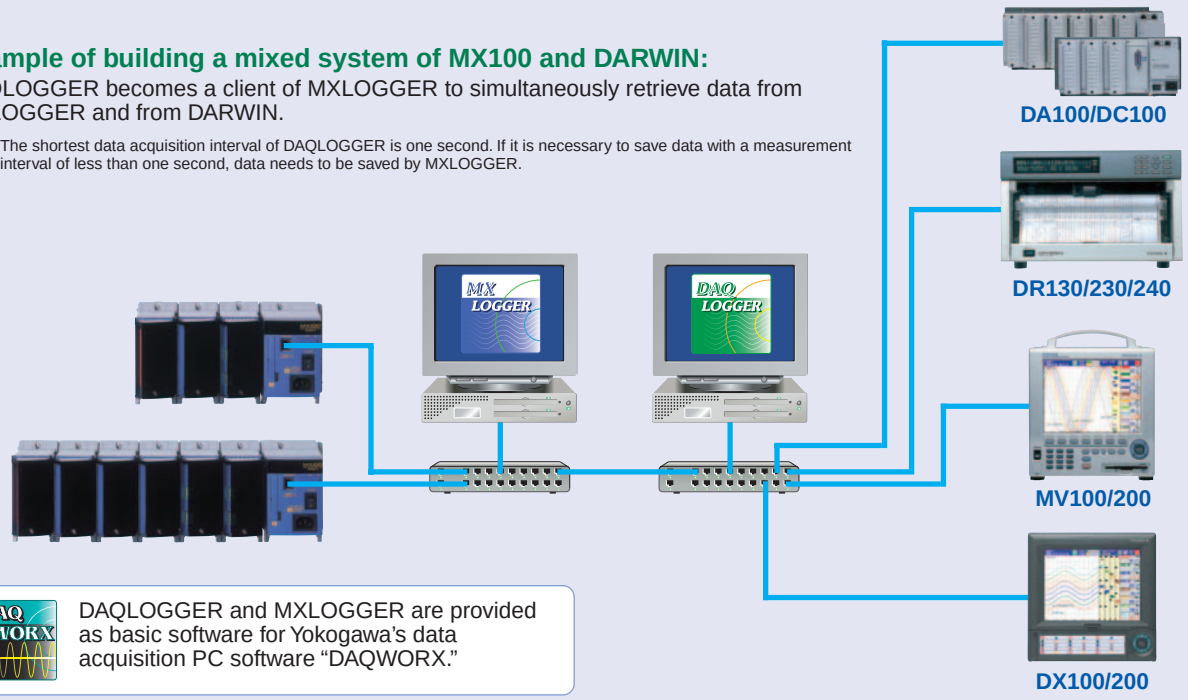
MXLOGGER is used to connect multiple MX units (up to 20 units) for data acquisition (one MX unit can also be connected). It consists of software elements (setting, logger (for saving data), monitor, and viewer) and the monitor server.

The monitor server function is used to enable connections with Yokogawa's data logging software, "DAQLOGGER." It is effective when combining MX units with Yokogawa's data acquisition equipment such as DARWIN and DAQSTATION. (DAQLOGGER is scheduled to be capable of supporting MXLOGGER's monitor server function in July 2003.)

Example of building a mixed system of MX100 and DARWIN:

DAQLOGGER becomes a client of MXLOGGER to simultaneously retrieve data from MXLOGGER and from DARWIN.

Note: The shortest data acquisition interval of DAQLOGGER is one second. If it is necessary to save data with a measurement interval of less than one second, data needs to be saved by MXLOGGER.



DAQWORX

DAQLOGGER and MXLOGGER are provided as basic software for Yokogawa's data acquisition PC software "DAQWORX."

API for MX100/DARWIN (Optional)

If users wish to create their own data acquisition software, please use this API. The API consists of a suite of functions to communicate with MX100/DARWIN. The suite of functions contains DLL (dynamic link library). API makes it possible to create data acquisition software dedicated to the MX, or data acquisition software combining the MX and DARWIN, or data acquisition software dedicated to DARWIN.

Three languages (Visual C, Visual C++, and Visual Basic) are supported.

Hardware Specifications

Common Specifications

• Normal operating conditions:

* Operating temperature range: 0-50˚C
* Operating humidity range: 20-80% RH for 0-40˚C
  10-50% RH for 40-50˚C
* Rated power supply voltage: AC power supply, 100-240 VAC
* Range of operating power supply voltage: AC power supply, 90-250 VAC
* Power supply frequency: 50 Hz ± 2%, 60 Hz ± 2%
* Power consumption: Up to approximately 70 VA when six modules are used
* Installation method: Desktop/floor and panel mount (using the DIN rail)
* Supported standards:

CSA	Obtained CSA22.2 No.1010.1. Installation category (Overvoltage category): II, Degree of pollution: 2	
UL	Obtained UL61010B-1 (CSA NRTL/C)	
CE	EMC directive	EN61326 EN61000-3-2 EN61000-3-3 EN55011 Class A Group 1
	Low voltage directive	EN61010-1 Measurement category: II, Degree of pollution: 2
C-Tick	AS/NZS 2064 Class A Group 1	

Model-Specific Specifications

• Main Module (MX100)

* Main functions: Control of the power supply and input/output modules, communication with the PC, storage of data on the CF card (during a communication failure)
* Number of maximum connectable input/output modules:
  6 (arbitrary for six modules or less)
* Measurement interval: Up to three types can be set per system (multi-interval)
  Types of measurement intervals are 10/50/100/200/500 ms, 1/2/5/10/20/30/60 sec.
  Note that configurable measurement intervals differ depending on modules.
* Transfer interval of measured data to the PC: Minimum 100 ms
* DO interval (update interval): 100 ms (not synchronized with timing every measurement interval of 100 ms)
* Filter function: First-order lag filter. The function can be set for each channel.
  Time constant = measurement interval × N (where N is any number of the following: 5, 10, 20, 25, 40, 50, and 100).
* Input computation function (computation function that can be executed in the main module)
  Computation of differences between channels:
  differential computation between arbitrary channels (DCV, TC, RTD, DI, scaling)
  Linear scaling computation
  Possible range for scaling: DCV, TC, RTD, DI
  Possible scope for scaling: –30,000 to 30,000
  Position of the decimal point: any digit
* Alarm (alarm function can be executed in the main module. This function is enabled even during a communication failure).
  Alarm types: Upper limit, lower limit, differential upper limit, and differential lower limit
  Number of settings: two items per channel
  Possible range for alarm setting: DCV, TC, RTD, DI, scaling
  Hysteresis: Alarm “ON/OFF” values are set arbitrarily.
  Number of alarm output points: 10-60 points according to the number of mounted “DO” modules
  Output mode: Excitation/non-excitation, OR, Hold/non-Hold, command output
* Saving the data
  Save function: Backup in the event of a communication failure during data acquisitions by the PC.
  Supported external media: CF Card (up to 2 Gbytes) Type, I, II × one slot
  Save trigger: When the timeout value (60 s) is exceeded if communication is interrupted during the PC’s data acquisitions.
  Save channel: Monitor “ON” channel
  Save interval: Data is saved automatically (approximately every 60 s)
  Stopping the save function: If the PC’s data acquisition is recovered or if the CF Switch is pressed.
  Data guarantee during a power failure:
  Guaranteed until data is written immediately before the MX is turned off (for example, power failure). The backup operation will not continue after the system recovers from a power failure.
* Indication
  LED: Indication of Ethernet status.
  7-segment indication: MX status indication by 7 segments in 2 digits (unit no., operation status indication, indication of error occurrence, indication of messages concerning the CF Card, etc.)
* Communication functions
  Interface: 100Base-TX/10Base-T (automatic detection) Ethernet
  Basic protocol: TCP, IP, UDP, ARP, ICMP
  Transmission function: Transmission of measured values and setting values
  Receiving function: Reception of setting values
* General specifications
  Power consumption: Approximately 8W for the main module only
  Insulation resistance: 20 MΩ or more (500 VDC) between the power supply terminal and the ground terminal
  Withstand voltage: 1500 VAC (50/60 Hz) between the power supply terminal and the ground terminal, one minute
  External dimension: Approximately 92 × 131 × 137 mm
  Weight: Approximately 0.85 kg
* Other functions
  Switch: 8-bit dip switch (for IP address initialization, etc.)
  CF switch: Switch to stop the data writing operations.

• Base Plate (MX150)

* Number of main modules that can be equipped: 1 (always equipped)
* Number of I/O modules that can be equipped:
  1-6 (to be specified according to the suffix codes)

• Four-Channel High-Speed Universal Input Module (MX110-UNV-H04)

* Types of measurement: DC voltage, thermocouple, RTD, DI (non-voltage contact, level (5 V logic))
* Number of measurement points: 4 (A/D to be equipped independently for each channel)
* Input method: Floating unbalanced input, insulation between channels
* A/D resolution: ±20000/±6000 (16-bit A/D is used)
* Measurement interval: 10/50/100/200/500 ms, 1/2/5/10/20/30/60 s
* A/D integral time: 1.67/16.67/20/36.67/100/200 ms, AUTO
  A/D integral time is determined by measurement intervals

* Measurement Ranges and Accuracies

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 mV	–20 mV to +20 mV	±(0.05% of rdg.+5 digits)	±(0.1% of rdg.+25 digits)	1 µV
	60 mV	–60 mV to +60 mV	±(0.05% of rdg.+2 digits)		10 µV
	200 mV	–200 mV to +200 mV			10 µV
	2 V	–2 V to +2 V	±(0.05% of rdg.+5 digits)	±(0.1% of rdg.+10 digits)	100 µV
	6 V	–6 V to +6 V	±(0.05% of rdg.+2 digits)		1 mV
	20 V	–20 V to +20 V			1 mV
	100 V	–100 V to +100 V			10 mV
Thermocouple RJC accuracy not included. Burn-out setting is “OFF.”	R	0.0 to 1760.0˚C	±(0.05% of rdg. +1˚C) However, R, S: 0 to 100˚C: ±3.7˚C 100 to 300˚C: ±1.5˚C B: 400 to 600˚C: ±2˚C Less than 400˚C: accuracy is not guaranteed	Measurement not possible	0.1˚C
	S				
	B	0.0 to 1820.0˚C			
	K	–200.0 to 1370.0˚C	±(0.05% of rdg. +0.7˚C) However, –200 to –100˚C: ±(0.05% of rdg. +1˚C)		
	E	–200.0 to 800.0˚C	±(0.05% of rdg. +0.5˚C) However, J, L: –200 to –100˚C: ±(0.05% of rdg. +0.7˚C)		
	J	–200.0 to 1100.0˚C			
	T	–200.0 to 400.0˚C			
	L	–200.0 to 900.0˚C			
	U	–200.0 to 400.0˚C			
	N	0.0 to 1300.0˚C	±(0.05% of rdg.+0.7˚C)		
	W	0.0 to 2315.0˚C	±(0.05% of rdg.+1˚C)		
	KpvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg.+0.7K)		0.1K
RTD measurement current (1 mA)	Pt100	–200.0 to 600.0˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.1˚C
	JPt100	–200.0 to 550.0˚C			
	Pt100: high resolution	–140.00 to 150.00˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.01˚C
	JPt100: high resolution	–140.00 to 150.00˚C			
	Ni100SAMA	–200.0 to 250.0˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.1˚C
	Ni100 DIN	–60.0 to 180.0˚C			
	Ni120	–70.0 to 200.0˚C			
RTD measurement current (2 mA)	Pt100	–200.0 to 250.0˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.1˚C
	JPt100	–200.0 to 250.0˚C			
	Pt100: high resolution	–140.00 to 150.00˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.01˚C
	JPt100: high resolution	–140.00 to 150.00˚C			
	Pt50	–200.0 to 550.0˚C	±(0.05% of rdg. +0.3˚C)	Measurement not possible	0.1˚C
	Cu10 GE	–200.0 to 300.0˚C	±(0.1% of rdg. +0.7˚C)		
	Cu10 L&N	–200.0 to 300.0˚C			
	Cu10 WEED	–200.0 to 300.0˚C			
	Cu10 BAILEY	–200.0 to 300.0˚C			
	J263B	0.0 to 300.0 K	±(0.05% of rdg. +0.3K)	Measurement not possible	0.1K
DI	Level	Vth = 2.4 V	Threshold level accuracy ±0.1 V		
	Contact	100 Ω or less: ON, 10 kΩ or more: OFF			

* Special Input Ranges (that can be used in MXLOGGER)

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	60 mV	0 to +60 mV	±(0.05% of rdg.+20 digits)	±(0.1% of rdg.+100 digits)	1 µV
	1 V	–1 V to +1 V	±(0.05% of rdg.+2 digits)	±(0.1% of rdg.+10 digits)	100 µV
	6 V	0 to +6 V	±(0.05% of rdg.+20 digits)	±(0.1% of rdg.+100 digits)	100 µV

Supported thermocouple: PLATINEL, PR40-20, NiNiMo, WRe3-25, W/WRe26, N (AWG14)
Supported RTD: PT100 (high noise resistance), JPt (high noise resistance), Cu10 (at 20˚C, a = 0.00392), Cu10 (at 20˚C, a = 0.00393), Cu25 (at 0˚C, a = 0.00425), Cu53 (at 0˚C, a = 0.00426035), Cu100 (at 0˚C, a = 0.00425), Pt25, Cu10 GE (high resolution), Cu10 L&N (high resolution), Cu10 WEED (high resolution), Cu10 BAILEY (high resolution)

* Reference junction compensation:
  External/internal switchover can be performed for each channel.
* Reference junction compensation accuracy:
  During the measurement of 0˚C or more and during the input terminal temperature balance
  Type R, S, W: ±1˚C
  Type K, J, E, T, N, L, U: ±0.5˚C
  (Note) Internal reference junction compensation of Type B is fixed to 0˚C.
* Maximum input voltage: 200 mV DC range or less, thermocouple, RTD, DI (non-voltage contact): ±10 VDC (continuous)
  Other measurement ranges: ±120 VDC (continuous)
* Normal-mode voltage:
  DCV, TC, DI (level): 1.2 times of rated range or less (50/60 Hz, peak values including signals)
  RTD 100 Ω system: 50 mV peak
  RTD 10, 25, 50 Ω systems: 10 mV peak
* Normal-mode rejection ratio (NMRR):
  When the integral time is 16.67 ms or more: 40 dB or more (50/60 Hz ±0.1%)
  When the integral time is 1.67 ms: 50/60 Hz is not rejected.
* Common-mode voltage: 600 VACrms (50/60 Hz), reinforced (double) insulation
* Common-mode rejection ratio (CMRR):
  120 dB or more when the integral time is 16.67 ms or more.
  80 dB or more when the integral time is 1.67 ms (50/60 Hz ±0.1%, 500 Ω imbalance, between the minus measurement terminal and the ground).
* Common mode voltage between channels: 250 VACrms (50/60 Hz), double insulation
* Noise rejection: Rejection by the integrating A/D converter and the use of low pass filters
* Input resistance: 10 MΩ or more for the DC voltage of 200 mV range or less and also for the thermocouple range. Approximately 1 MΩ if the DC voltage is 2 V range or more. Approximately 1 MΩ while measurement is stopped.
* Insulation resistance: 20 MΩ or more between the input and the ground (500 VDC)
* Input bias current: 10 nA or less (except for the burn-out setting)
* Withstand voltage: 2300 VAC (50/60 Hz) between input terminals, one minute
  3700 VAC (50/60 Hz) between an input terminal and the ground, one minute
* Input signal source resistance: 2 kΩ or less for DC voltage and thermocouple
  10 Ω or less per cable for RTD 50 Ω or 100 Ω systems
  1 Ω or less per cable for RTD 10 Ω or 25 Ω systems
* Thermocouple burn-out: Superposed electric current system, detection within the thermocouple range (“ON/OFF” possible)
* Parallel capacity during RTD: 0.01 µF or less
* Power consumption: Approximately 3 W
* External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
* Weight: Approximately 0.5 kg
* Terminal type: Clamp terminal. Applicable cable size is 0.2-2.5 mm² (AWG24-12)

• Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10)

* Types of measurement: DC voltage, thermocouple, RTD (non-voltage contact, level (5 V logic))
* Number of measurement points: 10 (scanning of 10 channels with one A/D)
* Input method: Floating unbalanced input, insulation between channels (Note that RTD is common among "b" terminals.)
* A/D resolution: ±20000/±6000 (16-bit A/D is used)
* Measurement interval: 100/200/500 ms, 1/2/5/10/20/30/60 s
* A/D integral time: 1.67/16.67/20/36.67/100/200 ms, AUTO, A/D integral time is determined by measurement intervals.
* Measurement Ranges and Accuracies

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 mV	–20 mV to +20 mV	±(0.05% of rdg.+5 digits)	±(0.1% of rdg.+25 digits)	1 µV
	60 mV	–60 mV to +60 mV	±(0.05% of rdg.+2 digits)	±(0.1% of rdg.+10 digits)	10 µV
	200 mV	–200 mV to +200 mV			10 µV
	2 V	–2 V to +2 V	±(0.05% of rdg.+5 digits)		100 µV
	6 V	–6 V to +6 V	±(0.05% of rdg.+2 digits)		1 mV
	20 V	–20 V to +20 V			1 mV
	100 V	–100 V to +100 V			10 mV
Thermocouple RJC accuracy not included.	R	0.0 to 1760.0˚C	±(0.05% of rdg. +1˚C) However, R, S: 0 to 100˚C: ±3.7˚C 100 to 300˚C: ±1.5˚C B: 400 to 600˚C: ±2˚C Less than 400˚C: accuracy is not guaranteed	±(0.1% of rdg. +4˚C) However, R, S: 0 to 100˚C: ±10˚C 100 to 300˚C: ±5˚C B: 400 to 600˚C: ±7˚C Less than 400˚C: accuracy is not guaranteed	0.1˚C
	S				
	B	0.0 to 1820.0˚C			
	K	–200.0 to 1370.0˚C	±(0.05% of rdg. +0.7˚C) However, –200 to –100˚C: ±(0.05% of rdg. +1˚C)	±(0.1% of rdg. +3.5˚C) However, –200 to –100˚C: ±(0.1% of rdg. +6˚C)	
	E	–200.0 to 800.0˚C	±(0.05% of rdg. +0.5˚C) However, J, L: –200 to –100˚C: ±(0.05% of rdg. +0.7˚C)	±(0.1% of rdg. +2.5˚C) However: –200 to –100˚C: ±(0.1% of rdg. +5˚C)	
	J	–200.0 to 1100.0˚C			
	T	–200.0 to 400.0˚C			
	L	–200.0 to 900.0˚C			
	U	–200.0 to 400.0˚C			
	N	0.0 to 1300.0˚C	±(0.05% of rdg.+0.7˚C)	±(0.1% of rdg. +3.5˚C)	
	W	0.0 to 2315.0˚C	±(0.05% of rdg.+1˚C)	±(0.1% of rdg. +7˚C)	
	KpvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg.+0.7K)	±(0.1% of rdg. +3.5K)	0.1K
RTD measurement current (1 mA)	Pt100	–200.0 to 600.0˚C	±(0.05% of rdg. +0.3˚C)	±(0.1% of rdg. +1.5˚C)	0.1˚C
	JPt100	–200.0 to 550.0˚C			
	Pt100: high resolution	–140.00 to 150.00˚C	±(0.05% of rdg. +0.3˚C)	±(0.1% of rdg. +1.5˚C)	0.01˚C
	JPt100: high resolution	–140.00 to 150.00˚C			
	Ni100SAMA	–200.0 to 250.0˚C	±(0.05% of rdg. +0.3˚C)	±(0.1% of rdg. +1.5˚C)	0.1˚C
	Ni100 DIN	–60.0 to 180.0˚C			
	Ni120	–70.0 to 200.0˚C			
	Pt50	–200.0 to 550.0˚C			
	Cu10 GE	–200.0 to 300.0˚C	±(0.1% of rdg. +2˚C)	±(0.2% of rdg. +5˚C)	
	Cu10 L&N	–200.0 to 300.0˚C			
	Cu10 WEED	–200.0 to 300.0˚C			
	Cu10 BAILEY	–200.0 to 300.0˚C			
	J263B	0.0 to 300.0K	±(0.05% of rdg. +0.3K)	±(0.1% of rdg. +1.5K)	0.1K
DI	Level	Vth = 2.4 V	Threshold level accuracy ±0.1 V		
	Contact	1 kΩ or less: ON, 100 kΩ or more: OFF (parallel capacity is 0.01 µF or less)			

* Special Input Ranges (that can be used in MXLOGGER)

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	60 mV	0 to +60 mV	±(0.05% of rdg.+20 digits)	±(0.1% of rdg.+100 digits)	1 µV
	1 V	–1 V to +1 V	±(0.05% of rdg.+2 digits)	±(0.1% of rdg.+10 digits)	100 µV
	6 V	0 to +6 V	±(0.05% of rdg.+20 digits)	±(0.1% of rdg.+100 digits)	100 µV

Supported thermocouple: PLATINEL, PR40-20, NiNiMo, WRe3-25, W/WRe26, N(AWG14)
Supported RTD: Cu10 (at 20˚C, α = 0.00392), Cu10 (at 20˚C, α = 0.00393), Cu25 (at 0˚C, α = 0.00425), Cu53 (at 0˚C, α = 0.00426035), Cu100 (at 0˚C, α = 0.00425), Pt25, Cu10 GE (high resolution), Cu10 L&N (high resolution), Cu10 WEED (high resolution), and Cu10 BAILEY (high resolution)

* Reference junction compensation: External/internal switchover can be performed for each channel.
* Reference junction compensation accuracy: During the measurement of 0˚C or more and during the input terminal temperature balance
  Type R, S, W: ±1˚C
  Type K, J, E, T, N, L, U: ±0.5˚C
  (Note) Internal reference junction compensation for Type B is fixed to 0˚C.
* Maximum input voltage: 200 mV DC range or less, thermocouple, RTD, DI (CONT): ±10 V DC
  Other measurement ranges: ±120 VDC
* Normal-mode voltage:
  DCV, TC, DI (level): 1.2 times of the rated range or less (50/60 Hz, peak values including signals)
  RTD 100 Ω system: 50 mV peak
  RTD 10, 25, 50 Ω systems: 10 mV peak
* Normal-mode rejection ratio (NMRR): 40 dB or more when the integral time is 16.67 ms or more (50/60 Hz ± 0.1%)
  50/60 Hz is not rejected when the integral time is 1.67 ms.
* Common-mode voltage: 600 VACrms (50/60 Hz), reinforced (double) insulation
* Common-mode rejection ratio (CMRR): 120 dB or more when the integral time is 16.67 ms or more.
  80 dB or more when the integral time is 1.67 ms
  (50/60 Hz ±0.1%, 500 Ω imbalance, between the minus measurement terminal and the ground)
* Common-mode voltage between channels: 120 VACrms (50/60 Hz)
* Noise rejection: Rejection by an integrating A/D converter and the use of low pass filters
* Input resistance: 10 MΩ or more for the DC voltage of 200 mV range or less and also for the thermocouple range
  Approximately 1 MΩ if the DC voltage is in the 2 V range or more
* Insulation resistance: 20 MΩ or more between the input and the ground (500 VDC)
* Input bias current: 10 nA or less (except for the burn-out setting)
* Withstand voltage: 1000 VAC (50/60 Hz) between input terminals, one minute.
  3700 VAC (50/60 Hz) between an input terminal and the ground, one minute.
* Input signal source resistance: 2 kΩ or less for DC voltage and thermocouple.
  10 Ω or less per cable for RTD 50 Ω or 100 Ω systems.
  1 Ω or less per cable for RTD 10 Ω or 25 Ω systems.
* Thermocouple burn-out: Checking of the burn-out at a detection interval specified for each measurement interval
* Parallel capacity during RTD: 0.01 µF or less
* Power consumption: Approximately 1.2 W
* External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
* Weight: Approximately 0.5 kg
* Terminal type: Clamp terminal. Applicable cable size: 0.14-1.5 mm² (AWG26-16)

• Ten-Channel High-Speed Digital Input Module (MX115-D05-H10)

* Input type: Non-voltage contact, open collector, level (5 V logic)
* Number of measuring points: 10
* Terminal type: Clamp terminal, Applicable cable size: 0.14-1.5 mm² (AWG26-16)
* Input format: Pull-up at approximately 5 V/approximately 5 kΩ. No insulation between channels
* Measurement interval: to be selected from 10/50/100/200/500 ms or 1/2/5/10/20/30/60 s
* Minimum detection pulse width: two times or more of a measurement interval
* Input threshold level:
  Non-voltage contact, open collector: "On" for 100 Ω or less, "Off" for 100 kΩ or more
  Level (5 V logic): "Off" for 1 V or less, "On" for 3 V or more
* Hysteresis width: Approximately 0.1 V
* Rated contact for connection to input terminals, rated transistor:
  Rated contact with 15 VDC or more and 30 mA or more
  Rated transistor with Vce > 15 Vdc and Ic > 30 mA
* Insulation resistance: 20 MΩ or more (500 VDC) between an input terminal and the ground
* Withstand voltage: 2300 VAC between an input terminal and the ground, one minute
* Power consumption: Approximately 1.5 W
* External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
* Weight: Approximately 0.5 kg

• Ten-Channel Medium-Speed Digital Output Module (MX125-MKC-M10)

* Number of output points: 10
* Terminal type: Clamp terminal. Applicable cable size for connectors: 0.08-2.5 mm² (AWG28-12)
* Contact mode: "A" contact (SPST)
* Update interval: output per 100 ms
* Contact capacity: 250 VDC / 0.1 A, 250 VAC / 2 A, 30 VDC / 2 A (resistance load)
* Insulation resistance: 20 MΩ or more (500 VDC) between an output terminal and the ground
  20 MΩ or more (500 VDC) between output terminals
* Withstand voltage: 2300 VAC between an output terminal and the ground, one minute
  2300 VAC between output terminals, one minute
* Power consumption: Approximately 2 W (when all relays are turned on)
* External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
* Weight: Approximately 0.5 kg
* Others: The excitation/non-excitation switchover and Hold/non-Hold switchover are available.

PC Software Specifications

• MX100 Standard Software (attached to the main module of MX100): for connection with one MX unit

* Integration Monitor (main functions): Setting of the basic connection, setting of various conditions (range, interval, computation, tag), monitor display (digital, trend), 32 channels in one group, 10 groups, logging, computation function (60 channels), alarm output, manual DO, etc.
* Viewer (main functions): Re-display of saved data files, 32 channels in one group, 50 groups, data synchronization processing, file merge display (limited to files that can be merged), multi-interval supported, graph, and digital display/print, etc.
* Calibration software (main function): calibration function
* Operating environment
  CPU: Intel Pentium II 400 MHz or more (recommended: Pentium III and 1 GHz or more)
  Memory: 256 MB or more (recommended: 512 MB or more)
  OS: Windows NT 4.0/2000/XP (recommended)
  Hard disk capacity: Free space of 50 MB or more (recommended: Hard disk with free space of 1 GB or more that operates at maximum speed)
  Communication interface: Ethernet that can be used for Windows (recommended: 100 Base-TX supported)
  CD-ROM drive: CD-ROM drive that can be used for Windows
  Printer: printer that can be used for Windows (to be used for printing)

• MXLOGGER (optional)

This is used to connect multiple MX units. Up to 20 units can be connected.

* Setting/Logger (main functions): Setting of the basic connection, setting of various conditions (range/alarm, interval, computation), project functions, logging, computation function (60 channels, computation across units possible), alarm output, file split function save, manual DO, activation of various types of software, etc.
* Monitor (main functions): Display-related settings, 32 channels in one group, 50 groups, monitor displays (trend, digital, meter, alarm), multi-interval supported, temporary suspension, tag, tag comment, channel display switchover, marking function, etc.
* Viewer (main functions): Re-display of saved data files, data synchronization processing, file merge display (limited to files that can be merged), 32 channels in one group, 50 groups, multi-interval supported, graph, and digital display/print, etc.
* Monitor Server (main functions): retention of 1,800-point data/channels, connection with DAQLOGGER possible, etc.
* Operating environment
  CPU: Intel Pentium III 800 MHz or more (recommended: Pentium 4 and 1.6 GHz or more)
  Memory: 512 MB or more (recommended: 1 GB or more)
  OS: Windows NT 4.0/2000/XP (recommended)
  Hard disk capacity: Free space of 100 MB or more (recommended: Hard disk with free space of 2 GB or more that operates at maximum speed)
  Communication interface: Ethernet that can be used for Windows (recommended: 100 Base-TX supported)
  CD-ROM drive: CD-ROM drive that can be used for Windows
  Printer: printer that can be used for Windows (to be used for printing)

• API for MX100/DARWIN (optional): a suite of functions for creating PC software

Supported models: MX100/DARWIN series
Supported OS: Widows 98/NT 4.0 SP3 or later/2000/XP(recommended) Communication system: TCP/IP (Ethernet)
User development environment: MS Visual Studio 6.0 SP5 or later (recommended)
Supported language: Visual C, Visual C++, Visual Basic

Model Name

Model	Suffix Code	Description
MX100		Main module
IM language	-E	English (with English instruction manual)
Power supply voltage	-1	100 VAC-240 VAC
Power supply inlet, power supply cord	D	3-pin power intel with UL/CSA cable
	F	3-pin power intel with VDE cable
	R	3-pin power intel with SAA cable
	Q	3-pin power intel with BS cable
	H	3-pin power inlet with CCC cable
	W	Screw terminal (power supply cord is not attached)

Model	Suffix Code	Option Code	Description
MX110			Analog input module for MX
Input type	-UNV		DCV/TC/DI/RTD
Measurement interval, number of channels	-H04		4 channels, high speed (shortest measurement interval: 10 ms)
	-M10		10 channels, medium speed (shortest measurement interval: 100 ms) *1
Option		/NC	The plate with clamp terminals is not attached. *1

*1 "/NC" can be specified only when "-M10" is specified.

Model	Suffix Code	Option Code	Description
MX115			Digital input module for MX
Input type	-D05		Non-voltage contact, level (5 V logic), open collector
Measurement interval, number of channels	-H10		10 channels, high speed (shortest measurement interval: 10 ms)
Option		/NC	The plate with clamp terminals is not attached.

Model	Suffix Code	Description
MX125		Digital output module for MX
Output type	-MKC	"A" contact (SPST)
Output interval, number of channels	-M10	10 channels, highest output interval: 100 ms

Model	Suffix Code	Description
MX150		Base plate for MX
Base type	-1	For connection with one main module and one input/output module
	-2	For connection with one main module and two input/output modules
	-3	For connection with one main module and three input/output modules
	-4	For connection with one main module and four input/output modules
	-5	For connection with one main module and five input/output modules
	-6	For connection with one main module and six input/output modules

Accessories

Model	Description
772061	Ten-Channel Screw Terminal Block

Note: The 772061 model is applicable only to MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module) or MX115-D05-H10 (Ten-Channel High-Speed DI Module).

Model	Suffix Code	Description
772062		Cable for connection between the input module and the screw terminal block
Cable length	-050	50 cm cable
	-100	100 cm cable

Note: The 772062 model is applicable only between MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module) and the Screw Terminal Block (772061) or between MX115-D05-H10 (Ten-Channel High-Speed DI Module) and the Screw Terminal Block (772061).

Model	Description
772063	Plate with clamp terminals

Note: The 772063 model is applicable only to MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module) or MX115-D05-H10 (Ten-Channel High-Speed DI Module).

Model	Description
772064	Clamp terminals

Note: The 772064 model is applicable only to MX110-UNV-H04 (Four-Channel High-Speed Universal Input Module).

Model	Description
772065	Clamp terminals

Note: The 772065 model is applicable only to MX125-MKC-M10 (Ten-Channel DO Module).

Model	Description
772066	Connector cover for base plate

Name	Model (Part No.)	Specifications
Shunt Resistance (for clamp terminals)	438920	250 Ω ± 0.1%
	438921	100 Ω ± 0.1%
	438922	10 Ω ± 0.1%
Shunt Resistance (for screw terminals)	415920	250 Ω ± 0.1%
	415921	100 Ω ± 0.1%
	415922	10 Ω ± 0.1%
CompactFlash Memory Card (CF card only)	B9968NM	32 MB
CompactFlash Memory Card (CF card only)	B9968NP	64 MB
CompactFlash Memory Card (CF card only)	B9968NQ	128 MB
CompactFlash Memory Card (CF card only)	B9968NR	256 MB
CompactFlash Memory Card (CF card only)	B9968NS	512 MB
Adapter for CompactFlash Memory Card	B9968NN	

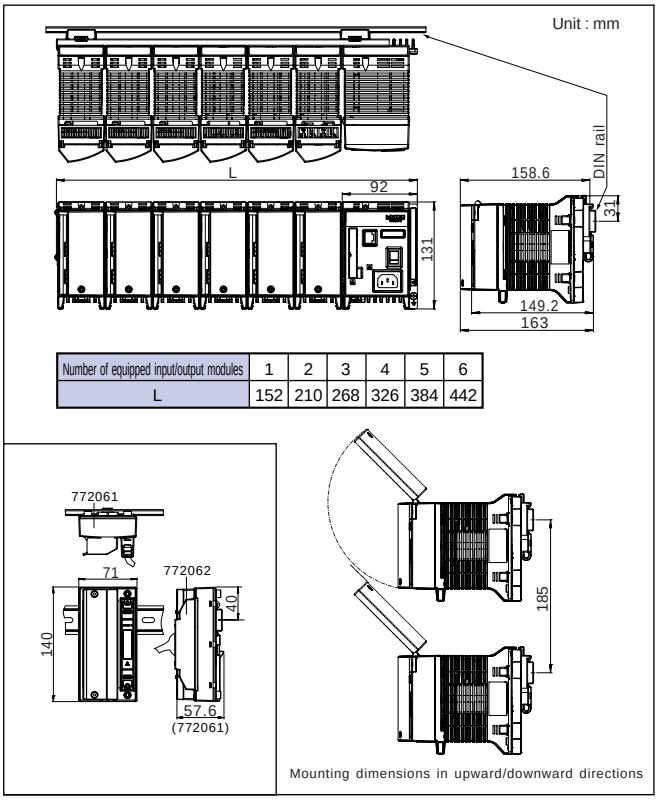
Application Software

Model	Remarks
MX180	MX100 Standard Software (For connection with one MX unit)

Model	Remarks
WX103	MXLOGGER (For connection with multiple MX units. Up to 20 units)
WX101	DAQLOGGER (For mixed connection of MX/DARWIN/MV/DX/μR)

Model	Remarks
MX190	API for MX100/DARWIN (Suite of functions for creating programs)

Exterior Dimensions



Number of equipped input/output modules	1	2	3	4	5	6
L	152	210	268	326	384	442

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NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.
- This product is not constructed to be explosion-proof.

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DAQMASTER

YOKOGAWA

New Input/Output Modules for the DAQMASTER Series

Introducing Seven New I/O Modules for the DAQMASTER Series.
The DAQMASTER Series continues to evolve, offering you higher measurement performance.

• Input Modules

Name	Model	Number of channels	Shortest Measurement Interval	Description
Strain Input Module	MX112-B12-M04	4	100 ms	Built-in bridge resistance of 120 Ω
	MX112-B35-M04			Built-in bridge resistance of 350 Ω
	MX112-NDI-M04			For connection with an external bridge head and strain gauge type sensor. (NDIS connector)
4-Wire RTD and Resistance Input Module	MX110-V4R-M06	6	100 ms	DC voltage, 4-wire RTD, 4-wire resistance, DI. Mixed input allowed.
24 V Digital Input Module	MX115-D24-H10	10	10 ms	24 V logic, Vth=12 V

Strain Input Modules

MX112-B12-M04
(120 Ω)

MX112-B35-M04
(350 Ω)

MX112-NDI-M04
(for connection with an external bridge head and strain gauge type sensor)

- MX112-B12-M04 and MX112-B35-M04 allow gauge connection methods to be independently selectable on each channel through DIP switch settings.
- When using strain gauge type sensors without remote sense wires with the MX112-NDI-M04, use a DV450-001 strain conversion cable (DARWIN accessory, sold separately).
- The model 319300 external bridge head (120Ω, sold separately) is available for the MX112-NDI-M04.

4-Wire RTD and Resistance Input Module

MX110-V4R-M06

Voltage ranges:
20 mV to 100 V
RTD ranges:
Pt50, Pt100, JPt100, Pt500, Pt1000, Cu10 and others.
Resistance ranges:
20 Ω, 200 Ω, 2 kΩ
Digital inputs:
Non-voltage contacts, 5 V logic

24 V Digital Input Module

MX115-D24-H10

Perfect for cost-effective measurement of multipoint 24 V logic signals.

Removable Terminals

772068
(for MX112-B12-M04, built-in bridge resistance of 120 Ω)

772069
(for MX112-B35-M04, built-in bridge resistance of 350 Ω)

772067
(for MX110-V4R-M06)

- The 772063 removable plate with clamp terminals can be used with the MX115-D24-H10.
- Of the new modules introduced in this leaflet, only the MX115-D24-H10 can use the 772061 (M4 screw type terminal block) + 772062 (connection cable).
- Of the new modules introduced in this leaflet, only the MX115-D24-H10 supports the /NC option.
  /NC: The plate with clamp terminals is not attached.

• Output Module

Name	Model	Number of channels	Output update interval	Description
Analog Output Module	MX120-VAO-M08	8	100 ms	Allows mixed voltage (±10 V) and current (4-20 mA) output
PWM Output Module	MX120-PWM-M08	8	100 ms	Pulse width modulation output module

Analog Output Module

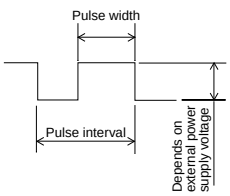
MX120-VAO-M08

- Output of set and calculated values, and retransmission of measured values.
- Use of external power supplies is not necessary with only voltage output. An external power supply (24 V) is required for current output.

PWM Output Module

MX120-PWM-M08

- Output of set and calculated values, and retransmission of measured values.
- Requires external power supply (4-28 V).
- Outputs pulse widths. Pulse intervals can be set from 1 ms to 300 s on each channel.



Removable Terminal

772065

The 772065 removable terminal is used with the MX120-VAO-M08 and MX120-PWM-M08.

Keep this leaflet with the MX100 Catalog (Bulletin 04M08B01-00E).

www.yokogawa.com/tm/
... and subscribe to "Newswave," our free e-mail newsletter

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■New Module Specifications

• Four–Channel Medium-Speed Strain Module (MX112-xxx-M04)

Types of measurement: Strain gauge or strain gauge sensor (static strain)
Number of measurement points: 4 (scanning of 4 channels with one A/D)
Input method: Floating balanced input
A/D resolution: ±20000 (16-bit A/D is used), except for an integral time of 1.67ms
A/D integral time: 1.67/16.67/20/36.67/100/200 ms, AUTO (power supply frequency is automatically detected and is set to 16.67/20 ms.) A/D integral time is determined by measurement intervals.
Measurement interval: 100/200/500 ms, 1/2/5/10/20/30/60 s
Gauge connection method: Single-gauge(2 or 3 wire), opposed-side two-gauge, adjacent–side two-gauge or four-gauge
Applicable gauge resistance: 100 to 1000 Ω. Built-in resistance of 120 Ω for –B12, and 350 Ω for –B35.
Bridge voltage: 2 VDC fixed (accurate to ±5 %)
Balance adjustment range: ±10,000 μ strain
Applicable gauge factor: 2.0 fixed, gauge factor correction possible with scaling function
Measurement ranges and accuracies (single-gauge method conversion, other gauge methods use conversion by scaling): The accuracy applies to standard operating conditions (See Note):

Note: ambient temperature: 23±2˚C, ambient humidity: 55±10%RH, supply voltage: 90 to 250 VAC, power frequency: 50/60Hz±1%, warm-up time: 30 minutes or more, without adverse conditions such as vibrations.

Measurement range	Measuring range	Integral time 16.67 ms or more		Integral time 1.67ms	
		Measurement accuracy	Resolution	Measurement accuracy	Resolution
2000 μstrain	±2000.0 μstrain	±0.5% of range	0.1 μstrain	2% of range	1 μstrain
20000 μstrain	±20000 μstrain	±0.3% of range	1 μstrain	1% of range	2 μstrain
200000 μstrain	±200000 μstrain	±0.3% of range	10 μstrain	1% of range	10 μstrain

Input resistance: 1 MΩ or more
Allowable wiring resistance: 100 Ω or less
Allowable input voltage: ±10 VDC (between H-L) continuous
Common mode voltage:
-B12,-B35: Between channels: 30 VACrms (50/60 Hz)
Between an input terminal and ground: 250 VACrms (50/60 Hz)
-NDI: Between channels: 30 VACrms
Between an input terminal and ground: 30 VACrms
(the connector shell is connected to earth potential.)
Common-mode rejection ratio (CMRR), (-NDI is not applicable.):
120 dB or more when the integral time is 16.67 ms or more. (50/60 Hz ±0.1%)
80 dB or more when the integral time is 1.67 ms. (50/60 Hz ±0.1%)
(voltage conversion value given a bridge voltage of 2 V)
Normal-mode rejection ratio (NMRR):
40 dB or more (50/60 Hz ±0.1%) when the integral time is 16.67 ms or more.
50/60 Hz is not rejected when the integral time is 1.67 ms.
(voltage conversion value given a bridge voltage of 2 V).
Insulation resistance (-NDI is not applicable.):
Between an input terminal and ground, 20 MΩ or more (500 VDC)
Withstanding voltage (-NDI is not applicable.):
Between an input terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between channels, 50 V peak or less
Power consumption: Approximately 3 W
Calculations related to strain measurement (performed on the main module):
Initial balance: The initial balance value is measured and set as the 0 point.
Initialization of the initial balance value: Returns the initial balance value to 0.
Reloading of the initial balance value: Reloads the saved initial balance value.
When using Yokogawa's dedicated software (MX100 standard software or MXLOGGER), the initial balance value is stored in the PC software project file. Reloading is performed by reading the project file.

• Six-Channel Medium-Speed 4-Wire RTD and Resistance Input Module (MX110-V4R-M06)

Types of measurement: DC voltage, 4-wire RTD, 4-wire resistance, DI (non-voltage contact, LEVEL (5 V logic))
Number of measurement points: 6 (scanning of 6 channels with one A/D)
Input method: Floating unbalanced input, isolation between channels

Measurement ranges and accuracies: at standard operating conditions (See Note)

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 m	-20.000 to 20.000 mV	±(0.05% of rdg. + 5 digits)	±(0.1% of rdg. + 25 digits)	1 μV
	60 mV	-60.00 to 60.00 mV	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	10 μV
	200 mV	-200.00 to 200.00 mV			
	2 V	-2.0000 to 2.0000 V	±(0.05% of rdg. + 5 digits)		100 μV
	6 V	-6.000 to 6.000 V	±(0.05% of rdg. + 2 digits)		1 mV
	20 V	-20.000 to 20.000 V			
	100 V	-100.00 to 100.00 V			10 mV
DI	Level	Vth = 2.4V	Threshold level accuracy ±0.1 V		
	Non-voltage contact	1 kΩ or less: ON, 100 kΩ or more: OFF (parallel capacity is 0.01 μ F or less) *1			
4-wire RTD measurement current(1 mA)	Pt100	-200.0 to 600.0˚C	±(0.05% of rdg. + 0.3˚C)	±(0.1% of rdg. + 1.5˚C)	0.1˚C
	JPt100	-200.0 to 550.0˚C			
	Pt100 (high resolution)	-140.00 to 150.00˚C			0.01˚C
	JPt100 (high resolution)	-140.00 to 150.00˚C			
	Ni100 SAMA	-200.0 to 250.0˚C			0.1˚C
	Ni100 DIN	-60.0 to 180.0˚C			
	Ni120	-70.0 to 200.0˚C			
	Pt50	-200.0 to 550.0˚C			0.1˚C
	Cu10 GE	-200.0 to 300.0˚C	±(0.1% of rdg. + 2˚C)	±(0.2% of rdg. + 5˚C)	0.1˚C
	Cu10 L&N	-200.0 to 300.0˚C			
	Cu10 WEED	-200.0 to 300.0˚C			
	Cu10 BAILEY	-200.0 to 300.0˚C			
	J263B	0.0 to 300.0 K	±(0.05% of rdg. + 0.3 K)	±(0.1% of rdg. + 1.5 K)	0.1 K
4-wire RTD measurement current (0.25 mA) *2	Pt500	-200.0 to 600.0˚C	±(0.05% of rdg. + 0.3˚C)	±(0.1% of rdg. + 1.5˚C)	0.1˚C
	Pt1000	-200.0 to 600.0˚C			
4-wire resistance	20 Ω (measurement current: 1 mA)	0.000 to 20.000 Ω	±(0.05% of rdg. + 7 digits)	±(0.1% of rdg. + 25 digits)	0.001 Ω
	200 Ω (measurement current: 1mA)	0.00 to 200.00 Ω	±(0.05% of rdg. + 3 digits)	±(0.1% of rdg. + 15 digits)	0.01 Ω
	2 kΩ (measurement current: 0.25 mA)	0.0 to 2000.0 Ω	±(0.05% of rdg. + 3 digits)	±(0.1% of rdg. + 10 digits)	0.1 Ω

*1: To be determined at the measurement current of approximately 10 μA and within the range of 200 mV. The threshold level is 0.1 V.
*2 The Pt500 resistance table is Pt100×5, and the Pt1000 resistance table is Pt100×10.

A/D resolution: ±20000/±6000 (16-bit A/D is used)
A/D integral time: 1.67/16.67/20/36.67/100/200 ms, AUTO (power supply frequency is automatically detected and is set to 16.67/20 ms.) A/D integral time is determined by measurement intervals.
Measurement interval: 100/200/500 ms, 1/2/5/10/20/30/60 s
Special input ranges (that can be used for MXLOGGER or API): Same as DCV and RTD ranges of MX110-UNV-M10
Maximum input voltage: 1 VDC range or less/RTD/resistance/DI (contact): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)
Normal mode voltage:
VDC, DI (LEVEL): 1.2 times the rated range or less (50/60 Hz, peak values including signals)
2 kΩ resistance, RTD 100/500/1000 Ω systems: 50 mV peak
200 Ω resistance, RTD 10/25/50 Ω systems: 10 mV peak
20 Ω resistance: 4 mV peak
Normal-mode rejection ratio (NMRR):
40 dB or more (50/60 Hz ±0.1%) when the integral time is 16.67 ms or more.
50/60 Hz is not rejected when the integral time is 1.67 ms.
Commn mode voltage: 600 VACrms (50/60Hz), reinforced (double) insulation
Common-mode rejection ratio (CMRR):
120 dB or more when the integral time is 16.67 ms or more. 80 dB or more when the integral time is 1.67 ms.
50/60 Hz ±0.1%, 500 Ω imbalance (for voltage), between the minus measurement terminal and ground
Common mode voltage between channels: 120 VACrms (50/60 Hz) for DCV/DI
50 VACrms (50/60 Hz) for RTD/resistance
Noise rejection: Rejection by the integrating A/D and the use of low pass filters.
Input resistance: 10 MΩ or more at the 1 VDC range or lower. Approximately 1 MΩ at the 2 VDC range or higher.
Insulation resistance: 20 MΩ or more between an input terminal and ground (500 VDC)
Input bias current: 10 nA or less
Withstanding voltage: Between input terminals (DCV or DI range), 1000 VACrms (50/60 Hz) for one minute
Between input terminals (RTD or resistance range), 620 VACrms (50/60 Hz) for one minute
Between an input terminal and ground, 3700 VACrms (50/60 Hz) for one minute
Input signal source resistance: 2 kΩ or less for DCV range
10 Ω or less per cable for the resistance and RTD ranges (common for all ranges)
Allowable parallel capacity: 0.01 μ F or less (when using the resistance or RTD range)
Power consumption: Approximately 1.2 W

• Ten-Channel High-Speed 24 V Digital Input Module (MX115-D24-H10)

Input type: Level (24 V logic), No isolation between channels
Number of channels: 10
Measurement interval: 10/ 50/100/200/500 ms, 1/2/5/10/20/30/60 s
Input resistance: Approximately 200 kΩ (between + and - terminals)
Maximum input voltage: 50 VDC
Minimum detection pulse width: two times the measurement interval or more
Input threshold level: "Off" for 6 V or less, "ON" for 16 V or more
Insulation resistance: 20 MΩ or more between an input terminal and ground (500 VDC)
Withstand voltage: 2300 VACrms (50/60Hz) between an input terminal and ground, one minute
Power consumption: Approximately 1.5 W

• Eight-Channel Medium-Speed Analog Output Module (MX120-VAO-M08)

Number of output points: 8
Output types: DC voltage, DC current (allows mixed voltage and current output)
Output data:
Command output, manual output: Output of set and calculated values, and retransmission of measured values are carried out by commands from the PC.
Retransmission output: Scales values measured on input modules in the same unit and outputs them. Output is continuous even when communications are cut as the operation is performed inside the main module.
You can select to output the previous value (the value just prior to the abnormality or the value when the power was last turned OFF) or a preset value when an abnormality occurs (such as when recovering after the power or communication was cut) and the power is ON.
Output update cycle: 100 ms
Rated output range: Voltage: -10 to 10 V, current: 0 to 20 mA, sourcing (4 to 20 mA is output at 1 to 5 V output)
Maximum allowable output range: Voltage: -11 to +11 V, current: 0 to 22 mA
Load resistance: Voltage: 5 kΩ or more, current: 600 Ω or less
Accuracy (at rated output): ±0.2% of F.S. (F.S.= 10 V or 20 mA) at standard operating conditions (See Note). However, for current output, accuracy is met at 1 mA or more.
Output resolution: 12 bit of F.S. or more
External power supply (used for current output): 24 V ±10% and current capacity of 250 mA or more.
Insulation resistance: Between an output terminal and ground, 20 MΩ or more (500 VDC)
Between output terminals, non-isolated (minus terminals share common potential)
Withstanding voltage: Between an output terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between output terminals, non-isolated (minus terminals share common potential)
Power consumption: Approximately 2.5 W (excluding power consumption of external voltage sources)

• Eight-Channel Medium-Speed PWM Output Module (MX120-PWM-M08)

Number of output points: 8
Pulse (output) interval: 1 ms to 30 s (1 ms interval setting range, set in 1 ms units per channel)
10 ms to 300 s (10 ms interval setting range, set in 10 ms units per channel)
Output data: Command output, manual output (details is as same as MX120-VAO-M08)
Output update cycle: 100 ms
Duty resolution: 1 ms interval setting range: 1/12000, 10 ms interval setting range: 1/60000
Output format: External power supply sourcing
ON resistance: 2 Ω or less (when the output current is 200 mA or more)
External power supply: 4 V to 28 V
Output capacity: Max 1 A/ch, however, the total of one module is 4 A or less
Insulation resistance: Between an output terminal and ground, 20 MΩ or more (500 VDC)
Between output terminals, non-isolated
Withstanding voltage: Between an output terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between output terminals, non-isolated
Power consumption: Approximately 2.5 W (excluding power consumption of external voltage sources)

Note: If temperature (thermocouple), resistance, or strain measurements are taken by the MX110 or MX112 at an integral time of 1.67 ms, the measured values may be susceptible to inaccuracies due to power supply frequency noise. If this is the case, set the integral time to 16.67 ms or longer (for a power supply frequency of 60 Hz), or 20 ms or longer (for a power supply frequency of 50 Hz). On DAQMASTER, the integral time is automatically set when selecting the measurement interval, but the relationship between the integral time and the measurement interval differs depending on the modules. If measured values are inconsistent, consult the user's manual for guidance on how to select a measurement interval that will yield a sufficient integral time.

• New Option (/DS) Added for the MX100 Main Module Dual Save Function:

The following three functions are now available.
1. Measured data can now be saved to the PC and CF card (installed in the MX100) simultaneously. This function only available when the system's shortest measurement interval is 100 ms or more.
2. Data can be saved to CF card without a PC. The CF card is installed in the MX100, allowing the MX100 to be used as a standalone logger.
3. Automatic retention function restores the operation mode that was active when the power was cut.

This option is included with style number S2 of the main module.

• PC Software Products

The following shows the availability and requirements of specific PC software products for use with the new input/output modules.

MX100 Standard Software (MX180): Simultaneous upgrade with new input/output modules (R1.02 to R2.01).
MXLOGGER (WX103): End of February 2005, upgrade (R1.03 to R2.01).
GateMX100: End of February 2005, upgrade (R1.02 to R2.01).
API (MX190): Simultaneous upgrade with new input/output modules (R1.02 to R2.01).
LabVIEW driver (free of charge): Available for download from the Yokogawa Web site starting at the end of February, 2005 (upgrade from REV 0.7 to REV 2.01).
In order to provide support for the new input/output modules, the main module (MX100) must be upgraded along with the software (from style number S1 to S2). Please be aware that revision 1.03 or earlier PC software products cannot be connected to the new main module (style S2). However, the style number of the main module is irrelevant if using the latest version of the software. For example, PC software of revision 2.01 or later can be connected to a style S1 main module without any problems. When purchasing PC software products, please confirm the versions of the main module and PC software that will be compatible with your configuration.

• For Current Owners of DAQMASTER Series Instruments

Use of the new input/output modules and options introduced in this leaflet requires upgrading of your main module and PC software. An upgrade kit for the main module is available (model 772050-01). For more details, please contact your nearest Yokogawa representative.

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